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PLUM GROWING

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Plum Growing

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The plum is the most widely distributed tree fruit in the United States. There are types suitable for every state. In the past plums were grown much more than at present throughout the United States. Since 1899 the number of plum trees in all except the Pacific Coast states has declined from over 16½ million to less than 3¾ million.

In New York the number of trees declined from nearly one million in 1899 to 415,000 in 1949 and to an estimated 304,000 trees in 1954. In the counties bordering Lakes Ontario and Erie, the number of trees declined from 360,000 in 1899 to 310,000 in 1949 and an estimated 225,000 in 1954. In eight Finger Lakes counties the decline was from 322,000 trees in 1899 to 16,000 trees in 1949. In other counties there were similar declines in tree numbers, except that in Ulster County plum trees increased in number from 17,000 to 31,000. The value of the crop in 1949 was slightly less than $500,000.

New York can still grow plums. The climate and soil are suitable. Plums are sold in substantial quantities in the large cities of the East. In 1955 California, Oregon, Washington and Idaho shipped more than 2400 carloads of plums during August, September and October into New York, New England, Pennsylvania, and the cities of Newark, N. J., Baltimore, Md., Washington, D.C., and Cleveland, Ohio. In spite of the fact that West Coast plum growers are 2500 miles from these markets, they have continued to supply the eastern markets for many years. This area is all within trucking distance of potential plum growing areas of New York. Processors of baby foods are important buyers of the prune types.

Location of the Plum Industry in New York

Niagara is the leading plum county with 148,000 trees in 1949. Wayne County was second with 92,000 trees. Other counties with more than 10,000 trees were Ulster, Monroe, Orleans, Columbia and Chautauqua. Elsewhere there are only a few scattered trees, mostly in home orchards.

Most of the commercial plantings are in the Lake Ontario fruit belt,

which extends along Lake Ontario from the Niagara River eastward to Oswego and varies in width from 3 to 10 miles. Here the climate is moderated by the influence of the water which delays blooming and prevents, or greatly reduces, the possibility of injury from late frosts. Winter temperatures near the lake are less likely to drop to minimums that might cause injury to the fruit buds or the trees. The nearer the orchard is to the lake, the greater the protection.

Plums are considerably hardier than peaches but less hardy than apples. Stanley, the principal variety now being planted, is one of the hardier of the European varieties and may be grown commercially in other parts of the state, especially in the Finger Lakes and the Hudson Valley, if the site is suitable.

The Site

Features of the site which should be considered carefully in advance of planting are the nearness to large bodies of water, the amount of the slope and its direction, and the possibility of good air circulation.

Where the protection of a large body of water is not available, a sloping site should be chosen. Broad ridges or gentle slopes from which the cold air can drain to lower areas on still nights are often satisfactory. Frost pockets, even though suitable sites in other respects, should be avoided. In them, too many crops will be lost from spring frosts. Moreover, minimum temperatures in winter are often much lower in a frost pocket. If the prospective planter does not know the site well, he can check the site by putting maximum and minimum thermometers at several levels on the proposed site and noting the temperatures at critical times during the winter and spring. Temperature differences of several degrees may occur between differences of a few feet in elevation. These differences in temperature may mean the difference between a crop and no crop.

South slopes warm up faster and trees bloom earlier than on north slopes. When there is a choice, a north slope is preferable because of the delay in blooming, especially with the early blooming Japanese varieties.

Fungus diseases, such as brown rot, may be less troublesome on sites with good air circulation.

The Soil

Plum orchards, to be profitable and long-lived, must be planted on good soils. The soil should be deep, at least 3 or 4 feet to the hardpan, or water table. Trees on shallow soils are subject to drought, are not well-anchored, and have a smaller volume of soil for vigorous root development.

Plums are usually thought to do better on clay loams, than on the lighter types, but they will thrive on sandy loam soils if they are well drained and in good physical condition. Aeration, which determines the extent of the root system, is more important than

Figure 1. A planting of Stanley prunes. The trees on the left show an unthrifty condition due to imperfect soil drainage. This effect of a wet soil became apparent the fifth year after the planting was made and has since resulted in poor growth and production.

texture. Where choice is permitted, the medium loams are to be preferred. The Japanese varieties will probably grow better on the lighter soils, while the European varieties should have the heavier types.

Good drainage is by far the most important feature of the site. Where the water table is high, the trees are shallow rooted; where the water table is low, the trees root deeply. Young trees may do well on shallow soils until their root systems extend to lower levels and an unusually wet season occurs. Because plums will tolerate more moisture than peaches or cherries, they are sometimes planted on soils that are too wet. The drainage conditions should be known over a period of years, because only one season in which the water table is too high for even a few days in the fall or spring may injure the root system sufficiently from a lack of oxygen to ruin the tree. The plum orchard should stand for many years if the environment is suitable.

The drainage should be natural, but wet spots in an otherwise suitable site may be drained with tile or a ditch.

Good drainage is indicated by uniform soil color, whereas a mottled condition indicates poor drainage. A mottled soil is often underlain by a heavy clay or an impervious hardpan which interferes with the downward movement of water. The soil should be examined to a depth of 3 feet at

several places on the site with a soil auger or by digging holes.

Alfalfa, a deeply rooted crop, is sensitive to poor drainage. Good persistent stands of alfalfa indicate that the site is well drained. Corn is a good indicator for one growing season. It is a waste of effort to plant an orchard on a site where an orchard has failed previously because of poor drainage.

Established orchards on sites that are too wet may be improved by plowing towards the trees to gradually get them on ridges, leaving a dead furrow between the rows to carry off excess water. Trees on poorly drained soils are shallow rooted and should be in sod rather than clean cultivated, since cultivation may injure the shallow root system. Heavier than usual fertilization may be advisable because of the limited foraging area available to the limited root system.

Heavily eroded sites on medium or steep slopes from which much of the topsoil has been removed are not suitable for plums.

The reaction of the soil is not important for plums, but it should be considered as a factor in the growth of the cover crop.

Sites from which plum orchards have recently been removed should not be replanted immediately to plums without an interval of several years of other crops, including a sod crop.

Varieties

The European varieties are the most important plums, and the most suitable for New York. The trees are more reliably productive and the fruits are superior to the Japanese varieties in dessert quality, culinary usefulness and in keeping and shipping qauilty.

Stanley, Italian Prune and Reine Claude are self-fruitful and are suitable pollinators for other European plum varieties, most of which should have suitable pollinators planted with them. The European and Japanese varieties are not suitable pollinators for each other.

The Japanese varieties are inferior in quality and general usefulness to the better European sorts, but their earlier ripening makes them useful in extending the plum season for roadside markets or home use. They bloom earlier than the European varieties and the flowers are thus more apt to be injured by spring frosts. They are often biennial bearing.

Cross-pollination should be provided for all Japanese varieties by planting other Japanese varieties with them. Burbank and Shiro do not pollinate each other.

In addition to the few varieties described here, a number of varieties are described in the catalog of the New York State Fruit Testing Cooperative Association, Inc., Geneva, New York. This catalog should be consulted by those who wish to plant a succession of varieties for home use or roadside markets. Some new varieties that may have commercial value are also described.

European varieties

De Montfort. An early ripening, medium sized, dark purple, good quality, freestone variety suitable for home use or the roadside market. The vigorous, spreading, open tree is an annual bearer. Self-unfruitful.

Stanley. The fruit is medium size, prune-shaped, dark blue with a heavy bloom, firm and of good quality, freestone. The tree is vigorous, upright-spreading, and bears early and heavy annual crops. It is more resistant to low winter temperatures and to frost while in bloom than most European varieties. Stanley is the best European prune type for commercial planting. It is suitable for canning and is preferred by the processors of baby foods.

Italian Prune (Fellenberg). The fruit is medium size, prune-shaped, dark blue with a heavy bloom, sprightly in flavor and very good in quality, freestone. The tree is vigorous and upright-spreading. Many Italian Prune trees are affected with a virus-like disease known as leaf casting mottle. The leaves and fruit drop prematurely, thus making the trees unproductive. A clone free of this condition is now available from some nurseries and it should be specified when Italian Prune trees are being ordered. For home use its rich, sprightly flavor and excellence for culinary purposes make it one of the best. The fruit hangs and keeps well on or off the tree.

Reine Claude. The fruit is of medium size, roundish oval, yellowish-green with golden yellow, firm, juicy flesh, sweet flavor and very good quality. It is one of the last to ripen. The high quality of this old variety recommends it for home use, but as green and yellow plums are usually less salable than the blue or purple varieties, it should not be planted for the general market unless there is an assured market for the crop.

Japanese Varieties

Shiro. An early, roundish conic, light yellow, thin-skinned, very juicy, sweet, good quality variety. The tree is large, vigorous, spreading, productive, and hardy. Useful chiefly for local markets because of its earliness and attractive appearance.

Abundance. Fruit medium size, roundish ovate, red, very juicy, tender, sweet, good, clingstone. Tree large, vigorous, vase-shaped, productive, annual bearing and hardy. Useful for home use and local markets. Ripens unevenly.

Burbank. Fruit medium, or large if tree is not overloaded, roundish conic, dark red, juicy, firm, sweet, good, clingstone. Tree large, vigorous, sprawling, flat, open top, very productive in alternate years, one of hardiest Japanese varieties. Unless Burbank is thinned severely in the bearing year, the fruit will be small and of poor quality. Burbank has been widely planted for home

use and local markets before the better European varieties ripen.

Santa Rosa. Fruit large, roundish conic, dark purplish crimson, flesh dark red, juicy, firm, good, clingstone. Tree large, vigorous, upright, productive with tendency to light crops in alternate years, hardy in normal winters. Useful for commercial planting for local markets because of its large size, attractive appearance and good handling qualities.

Japanese-American Hybrids

These hybrids of Minnesota and South Dakota origin are unusually hardy and are suitable for planting in the colder parts of the state where the Japanese and European varieties are not winter hardy.

Underwood, early, red, and **Monitor**, red, and later, are as good as any of the dozen or more varieties of this group. They are uncertain pollinators for each other. The varieties Surprise, Kaga, Toka and South Dakota are suitable pollinators for the Japanese-American Hybrids.

Damson Varieties

The Damson varieties are small, purplish, tart plums that are excellent for jam, jelly and plum butter, but of no value for dessert. The trees are very hardy, very productive, and the fruits are not susceptible to brown rot. The market for Damsons is limited, so extensive plantings should not be made unless there is a known market for the crop.

A number of varieties, all very similar, are sold by nurseries, but Shropshire is more generally available than the others and is as good as any of them.

Propagation

Plum varieties are propagated by budding them on seedlings of the Myrobalan plum which is generally considered the best rootstock for most varieties except the Japanese-American hybrids. These should be propagated on American plum seedlings.

Frequently Myrobalan seedlings are found in the nursery row with a leaf abnormality termed "chlorotic fleck". Affected seedlings are reduced in vigor and varieties budded on them are also reduced in vigor and are unsuitable for orchard planting. Stanley trees budded on seedlings affected by "chlorotic fleck" develop a constriction at the bud union and are short-lived. Stanley, therefore, should not be budded on seedlings with "chlorotic fleck" symptoms on the leaves.

Plums are occasionally budded on peach seedlings, but these should be planted only on the lighter soils that are suitable for peaches. If planted on the heavier soils often used for plums, the trees on peach roots may be short-lived. The grower, therefore, should know the rootstock on which the trees are budded.

The Western Sand Cherry (*Prunus besseyi*) in tests at the Experiment Station at Geneva has proved to be a satisfactory dwarfing rootstock for the

Italian and Stanley varieties. Japanese varieties on this rootstock make very small trees suitable for home garden planting.

Top-grafting in the spring may be done to provide a pollinating variety or for a quick test of a new variety.

Damson plum trees should not be top-worked to Italian Prune because the Damsons are often symptomless carriers of prune dwarf, a virus disease The Italian Prune will be greatly reduced in vigor and productiveness. Symptoms of prune dwarf on Italian Prune are small, narrow, misshapen leaves.

Details of methods of propagating fruit trees may be found in Cornell Extension Bulletin 773.

Planting

Trees for planting should be either the No. 1 one-year-old or the No. 1 two-year-old size. The one-year-old trees experience less shock from transplanting and are preferred by commercial growers. With the one-year-old trees, which are unbranched whips, the grower has a better opportunity to shape the tree as he prefers than with the branched two-year-old tree.

Plums may be planted in the fall in the better fruit growing regions of the state. Fall-planted trees may have the advantage of not having spent the winter bare-rooted in the nursery cellar. Spring plantings can be successful, however, if the trees are in good condition. Spring planting is sometimes delayed by unfavorable weather so that the trees are not well established before hot, dry weather arrives and heavy mortality may result.

If large plantings are to be made, the grower should arrange to get the trees at the nursery as soon as they are dug. The trees should not be dug until the leaves have fallen or are nearly ready to fall naturally. At no time from digging to planting should the roots be exposed to the sun and drying wind for more than a few minutes.

Plums are usually spaced 20 feet by 20 feet. Closer spacing will eventually result in crowding and shading of the lower limbs which are reduced in vigor and productiveness and may die.

Trees received from the nursery should be planted promptly if possible. If necessary to keep them for a few days, they should be "heeled in" in a trench with moist soil packed firmly around the roots. If the trees are dry on arrival, they may be buried a few days in moist soil or sawdust or soaked for a few hours in water. Trees that are badly dried out, either from improper storage, or a long time in transit, should be rejected.

Trees that have to be held two or three weeks in the spring before planting should be put in cold storage at a temperature not lower than 32° with the roots protected.

Orchards on steep slopes that are to be cultivated should be planted on the contour to prevent soil losses from erosion. Otherwise a sod mulch sys-

tem of soil management should be followed.

A well-set tree is one with all the roots in such firm contact with the soil that the tree will resist a strong pull without being loosened. The bud union should be at or slightly below the ground level.

The hole is dug large enough to accommodate the root system without crowding. Broken roots and bruised ends are cut off cleanly at planting time, but the root system should not be reduced more than is necessary. As the soil is filled in around the roots the tree is moved up and down and the soil is tramped with the feet to make sure that it is firmly packed around the roots.

The newly planted tree should not be fertilized the first year, because the limited root system is easily injured by too much fertilizer.

If prolonged drought occurs, the young trees should be watered thoroughly before they are injured. Mulch may be applied to conserve this water.

Soil Management

The young trees should be cultivated for the first three or four years with a cover crop seeded in midsummer. Later, as the trees come into bearing, the orchard may be cultivated with cover crops, grown in sod, or mulched, depending on the soil, the site, and the personal preferences and experience of the grower.

Intercrops may only be grown between the tree rows during the first two or three years after planting, if ample space is left for the care of the trees, or the space may be left in sod with the tree rows only being cultivated.

On level sites cultivation until midsummer, followed by the seeding of a cover crop will be satisfactory. Cultivation should be as shallow as possible and only frequent enough to discourage heavy weed growth. Frequent, deep and very thorough cultivation is expensive and damaging to tree roots and soil structure. In mid-summer a cover crop should be sown. Domestic ryegrass, wheat, rye vetch and buckwheat are commonly used crops. These should be turned under in the spring before the trees have made much growth.

On sloping sites subject to erosion, or even on level sites, plum trees may be grown satisfactorily in sod if the nutrient requirements of the tree are satisfied. Plum trees in sod should be on deep fertile soils where the trees can root deeply and be less subject to competition with the sod for soil moisture. Occasionally it may be necessary to reduce the vigor of the sod by disking.

Mulching of plum trees is a satisfactory practice, particularly on steep slopes or shallow and drought-susceptible soils. Mulching material should be available nearby at low cost for its use to be practicable. If straw is used, additional nitrogen may be needed for the first year or two. Hay and straw mulches applied regularly over a few years will supply substantial quantities

of nutrients to the trees so that the fertilizer applications may be reduced.

In mulched orchards, particular attention should be paid to mouse control and the danger of fire.

Fertilizers

There is very little experimental work on which to base fertilizer recommendations for plums in New York. Plum trees, like other fruit trees, may be expected to respond profitably to nitrogen fertilization. In limited tests, plum trees have shown a greater response to nitrogen than apple trees.

Plum trees in a number of New York orchards have shown marked potash deficiency symptoms. Leaf scorch has been shown to be associated with low potassium content of Italian prune foliage. Applications of potash have increased the potassium content of the leaves and markedly improved the appearance and vigor of the trees.

The leaves of potassium-deficient trees appear normal in spring and early summer, but by mid-July the first symptoms appear. The normal green color begins fading at the margins. As this chlorosis progresses, the margins of the older shoot leaves roll inward towards the upper surface, and finally the marginal tissue dies. On severely affected trees nearly all the leaves show progressive development of these symptoms. On less severely affected trees only the older leaves on the outer branches are severely affected. On slightly affected trees, the symptoms develop late on the outer branches and may not progress beyond the leaf roll state.

No hard and fast rules may be laid down as to amounts of fertilizer applications. The needs of the tree will vary greatly from light, sandy loams to heavy fertile clay loams, whether the orchard is cultivated, mulched, or in sod, and previous fertilization. Assuming that nitrogen is probably needed, the basic amount to be applied might be one-fourth pound or less of ammonium nitrate for trees 1 to 3 years of age, one-fourth to one pound for 3 to 5 year old trees, and 2 to 3 pounds for older trees. Other nitrogen carriers such as nitrate of soda, sulfate of ammonia and urea may be used instead to supply equivalent amounts of nitrogen. Tree vigor as shown by large, dark green, healthy-appearing foliage and vigorous shoot growth, should be the guide, and these amounts should be varied up or down according to the observed needs of the tree.

If symptoms of potash deficiency are present, either sulfate or muriate of potash should be applied at the rate of 300 pounds to the acre, or about 3 pounds to the bearing tree. The effects of potash on the tree become evident much more slowly than the effects of nitrogen, and it may be a year or two before the potassium deficiency symptoms disappear. Mulching is effective in hastening the uptake of potassium by the tree. Hay and straw mulches contribute substantial

quantities of potash as they decay. Well-mulched trees after a few years may not need much chemical fertilizer.

The fertilizer should be applied in early spring two or three weeks before bloom. It should be spread from the trunk to the outer reach of the branches.

Cover crops or the sod should be fertilized according to their needs, which ordinarily include phosphorus, in addition to nitrogen and potassium. Acid soils may need lime for some cover crops.

Pruning

The objective in pruning young plum trees is to produce structurally sound trees that will not break later under the stress of heavy crops. The modified central leader tree is considered superior to the central leader, or vase-shaped tree.

The young trees as received from the nursery are usually branched, and the scaffold branches are selected at planting time. These consist of 4 or 5 branches spaced about 6 inches apart around the trunk and pointing in different directions. The others are removed. If one-year-old unbranched whips are planted, these should be headed at about 18 inches from the ground. The scaffold branches are selected a year later. During the first few years the leader, or trunk, is maintained until the scaffold branches are well developed. The leader is then suppressed by cutting it back to an outward growing lateral, and it becomes a scaffold branch.

Thereafter until the trees are of bearing age, little pruning is needed. Heavy pruning tends to dwarf the trees, delay fruiting, and may result in winter injury if the trees are subjected to an unusually cold winter. Any pruning that is done should be corrective in nature. If poor crotches develop, one member should be cut back each year until it becomes a branch of the other. Branches that are crowding others should be removed. If this is done each year, the cuts will be small and few or no large cuts will be needed when the trees are older. It is much better to err on the side of too little, rather than too severe pruning.

Bearing plum trees should be pruned lightly each year, rather than heavily at intervals of several years. The tree should be kept open to facilitate spraying and air circulation, both important in brown rot control. The weak wood should be thinned throughout the tree by making many small cuts rather than a few large cuts (see figures 2, 3, 4 and 5).

Trees that are declining in vigor from age and heavy bearing may need somewhat heavier thinning and cutting back to stimulate more vigorous growth. Usually, however, better cultural practices and increased fertilization should be practiced for this purpose rather than severe pruning.

Vigorous water sprouts and broken limbs should be removed. All black knot galls should be removed or this disease can rapidly become serious if this is neglected.

Figure 2. A mature Japanese plum tree, variety Burbank, in need of pruning.

Figure 3. The same tree shown in figure 2 after weak wood and crowded branches were removed. A few of the longer branches were cut back to laterals.

Figure 4. A mature European plum, variety Stanley, in need of pruning.

Figure 5. The same tree shown in figure 4 after pruning. In addition to moderate thinning of the fine wood and heading back of the tallest branches, one of the larger limbs was removed to correct a poor framework.

Thinning

The European varieties, Stanley, Italian Prune, De Montfort, and Reine Claude, are not likely to respond profitably to thinning. The Japanese varieties usually set very heavy crops in alternate years and unless severe thinning is practiced, the fruits will be too small for market, of poor quality, and may rot badly. Limb breakage may be serious if the trees are overloaded.

Chemical thinning procedures have not been worked out for New York. The fruits should be thinned soon after the June drop to a spacing of 3 to 4 inches.

Harvesting and Marketing

Plums increase markedly in size, sugar content and quality as they approach maturity. Immature, poorly colored plums are an inferior product that will bring a low price and reduce the demand for the fruit. Tree-ripened plums have much greater consumer appeal, but require more care in handling than less ripe fruit. Growers who expect to create a demand for plums that will persist from year to year must pick the fruit when ripe and handle it carefully to avoid bruises and skin punctures.

Stanley, Italian Prune, Burbank and the Damson varieties are firm and less subject to bruising than Abundance and Shiro which are soft when ripe.

Fruit that is not marketed shortly after harvest should be held at temperatures not much above 32°F.

Stanley and Italian Prune for the processor should be picked according to his maturity specifications.

Control of Diseases and Insects

Control measures for the principal diseases and insects which affect plums may be found in Cornell Extension Bulletin 711. The Extension Service in counties where plums are grown extensively and the Departments of Entomology and Plant Pathology at the College of Agriculture, Ithaca, N. Y., and the New York State Agricultural Experiment Station, Geneva, N. Y., can supply additional information on spray schedules and materials.

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